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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/500,366	02/08/2000	Paul W, Dent	P-4015-359	2492

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EXAMINER
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WANG, TED M

ART UNIT	PAPER NUMBER
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2634

DATE MAILED: 09/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/500,366

Applicant(s)

DENT, PAUL W.

Examiner

Ted M Wang

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 19 July 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-78 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-20 is/are allowed.
- 6) ☒ Claim(s) 21, 22, 25-36, 40-49, 54-61 and 63-78 is/are rejected.
- 7) ☒ Claim(s) 23, 24, 37-39, 50-53, and 62 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 July 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

### **DETAILED ACTION**

1. Claims 1-78 are pending in the application.

#### ***Examiner's Statement***

2. Applicant's amendment paper #8 filed on July 19, 2004, has been fully considered. The applicant adds new claims 54-78.
3. The indicated allowability of claims 21-53 are withdrawn in view of the newly discovered reference(s) to Razzell (US5,428,643), Dent (US5,673,291), and Dent (US5,867,537). Rejections based on the newly cited reference(s) follow.

#### ***Drawings***

4. The drawing should label all the elements in the figures. For example, in Fig.2 104 should be labeled as Counter. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

#### ***Claim Objections***

5. Claims 54 and 59 are objected to because of the following informalities:

- Delete "using weighting factors" from claim 54 line 9 and claim 59 line 3.

Appropriate correction is required.

#### ***Claim Rejections - 35 USC § 112***

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claim 40 is rejected under 35 U.S.C. 112, second paragraph that recites the limitation "the octal symbols" in line 1. There is insufficient antecedent basis for this limitation in the claim.

***Claim Rejections - 35 USC § 102***

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 54-57 are rejected under 35 U.S.C. 102(b) as being anticipated by Razzell (US5,428,643).

- In regard claim 54, Razzell discloses a method of and transmitter for transmitting a digital signal with receiving over a plurality of symbol periods successive data symbols to be transmitted, each data symbol comprising a plurality of input bits (Fig.1 element 10-13 and column 3 line 42 – column 4 line 21):  
combining the input bits in said data symbols to generate derived bits (Fig.1, Fig.5, and Fig.6 elements 10-13 and column 3 line 42 – column 4 line 21):  
bit-wise filtering selected input bits and derived bits to generate component waveforms (column 4 line 8 – column 5 line 20);  
generating filtered quadrature modulation waveform signal having a real part and an imaginary part (Fig.1 elements 13-17, Fig.5 elements 13, and 30-52, and Fig.6 elements 13, shift registers, look up tables, and 44, and 46) by selectively

combining the component waveforms using weighting factors selected to produce a desired signal constellation (column 4 line 1- column 6 line 54).

- In regard claim 55, all limitation can further be taught in Fig.5 elements shift registers, ROM, 31-46, 16-28, and column 5 line 26 – column 6 line 39.
- In regard claim 56, the limitation that the filtered waveform segments are stored as one or more numerical sample values can further be taught in Fig.3 and Fig.5 elements 40 and 42, column 5 line 1- column 6 line 39.
- In regard claim 57, the limitation of addition at least two component waveforms in a filter adder to form the imaginary part of the modulation waveform; and addition at least two component waveforms in a filter adder to form the real part of the modulation waveform can further be taught in Fig.5 and 6 elements 46 and 44 and column 6 lines 1-54.

***Claim Rejections - 35 USC § 103***

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 21, 22, 25, 29-33, and 41-43, and 67-78 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dent (US5,673,291) in view of Razzell (US5,428,643).

- In regard claim 21, Dent discloses a communication transmitter with inputting data symbols to a logic unit over a plurality of successive symbol periods, wherein each data symbol comprises a plurality of information bits (Fig.2a elements 20-22 and column 5 lines 14-52); forming in the logic unit at least two derived bits during each symbol period by combining selected information bits (Fig.2b, column 5 lines 24-67, and column 8 lines 1-67); forming, during each symbol period, a plurality of bit sequences, each bit sequence containing bits input or derived over a plurality of symbol periods (column 5 lines 14-67 and column 11 line 7 – column 12 line 4); generating, during each symbol period, a plurality of filtered waveform segments using the bit sequences (column 11 line 16 – column 12 line 4) except specifically teaching combining, during each symbol period, at least two of the filtered waveform segments to obtain a segment of the imaginary waveform part and combining, during each symbol period, at least two of the filtered waveform segments to obtain a segment of the real waveform part.
- Razzell teaches a method of and transmitter for transmitting a digital signal with combining, during each symbol period, at least two of the filtered waveform segments to obtain a segment of the imaginary waveform part (Fig.5 and 6 element 46 and column 5 line 26 – column 6 line 54); and combining, during each symbol period, at least two of the filtered waveform segments to obtain a

segment of the real waveform part (Fig.5 and 6 element 44 and column 5 line 26 – column 6 line 54) so as to reduce the size of the lookup table and memory.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Dent's modulation waveform generator and balanced I/Q filter in view of Razzell's teaching in order to reduce the size of the lookup table and memory.

- In regard claim 22, the limitation that the data symbol comprises first, second, and information bits can further be taught by Razzell in Fig.1 and column 3 line 42 – column 4 line 21.
- In regard claim 25, the limitation that the filtered waveform segments each comprise a number of numerical samples spaced over each symbol period can further be taught by Razzell in Fig.5 elements 13, 41A, and 42, and column 5 line 42 – column 4 line 21.
- In regard claim 29, the limitation that combining at least two of the filtered waveform segments to form a segment of the imaginary part of the modulation waveform comprises forming a weighted sum of a numerical sample of a first filtered waveform segment with a numerical sample of at least one other filtered waveform segment can further be taught by Razzell in Fig.5 and 6 element 46 and column 5 line 26 – column 6 line 54.
- In regard claim 30, the limitation that combining at least two of the filtered waveform segments to form a segment of the real part of the modulation waveform comprises forming a weighted sum of a numerical sample of a first

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filtered waveform segment with a numerical sample of at least one other filtered waveform segment can further be taught by Razzell in Fig.5 and 6 element 44 and column 5 line 26 – column 6 line 54.

- In regard claim 31, the limitation that combining at least two of the filtered waveform segments to form a segment of the imaginary part of the modulation waveform comprises connecting a first filtered waveform segment through a first impedance to an output terminal and connecting a second filtered waveform segment through a second impedance to the output terminal to produce a weighted sum of the combined filtered waveform segments at the output terminal can further be taught by Razzell in Fig.5 element 46 combiner output.
- In regard claim 32, the limitation that combining at least two of the filtered waveform segments to form a segment of the imaginary part of the modulation waveform comprises connecting a first filtered waveform segment through a first impedance to an output terminal and connecting a second filtered waveform segment through a second impedance to the output terminal to produce a weighted sum of the combined filtered waveform segments at the output terminal can further be taught by Razzell in Fig.5 element 44 combiner output.
- In regard claim 33, the limitation that generating a plurality of filtered waveform segments comprises using the bit sequences as an address to a look-up table containing pre-computed filtered numerical samples of the filtered waveform segments can further be taught by Razzell in column 26 – column 6 line 39.



- In regard claim 41, which is a waveform generator claim related to claim 21, all limitation is contained in claim 21. The explanation of all the limitation is already addressed in the above paragraph.
- In regard claim 42, which is a waveform generator claim related to claim 33, all limitation is contained in claim 33. The explanation of all the limitation is already addressed in the above paragraph.
- In regard claim 43, which is a waveform generator claim related to claim 25, all limitation is contained in claim 25. The explanation of all the limitation is already addressed in the above paragraph.
- In regard claim 67, the limitation that the first and second combiners use weighting factors to combine said component waveforms selected to produce a desired signal constellation can further be taught by Razzell in (column 4 line 1- column 6 line 54). All other limitation is contained in claim 41. The explanation has been described in above paragraph.
- In regard claim 68, the limitation that the filter comprises a lookup table storing pre-computed component waveform can further be taught by Razzell in Fig.5 elements shift registers, 30-38, and column 5 line 26 – column 6 line 39.
- In regard claim 69, all limitation can further be taught Razzell in Fig.5 elements shift registers, ROM, 31-46, 16-28, and column 5 line 26 – column 6 line 39.
- In regard claim 70, the limitation that the first and second combiners comprise adders to add selected component waveforms can further be taught by Razzell in Fig.5 elements 44 and 66.

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- In regard claim 71, the limitation that a plurality of buffers for storing the over-sampled numerical values output by said lookup table can further be taught by Dent ('537) in Fig.4 elements 50a, 50b, and column 6 lines 9-34; and resistive combining networks to combine the over-sampled numerical values corresponding to at least two component waveforms to form each of the real and imaginary parts of the modulation waveform can further be taught by Dent ('537) in Fig.4 elements 4x chiprate clock, 60a, 60b, 32a, 32b, and 43, and column 6 lines 9-53.
- In regard claim 72, all limitation can further be taught by Dent ('537) in Fig.4 elements 95, 50a and 50b, 60a and 60b, 80a 80b, 90a, and 32a and 32b and column 6 lines 9-53.
- In regard claim 73, the limitation that the filter comprises a plurality of resistive combining networks to generate the component waveforms can further be taught by Dent ('537) in Fig.4 elements 60a and 60b, 80a 80b, and column 6 lines 9-53.
- In regard claim 74, all limitation can further be taught by Razzell in Fig.5 elements shift registers, ROM, 31-46, 16-28, and column 5 line 26 – column 6 line 39.
- In regard claim 75, the limitation that the first and second combiners comprise summing nodes connected to the outputs of respective resistive combining networks to sum the waveform components can further be taught by Dent ('537) in Fig.3 elements 90 and 70.

- In regard claim 76, the limitation that the first and second resistive combining networks each comprise two outputs and generate the waveform components in balance form can further be taught by Dent ('537) in Fig.3 elements 71 and 91, Fig.4 elements 60a and 60b, 80a 80b, and 32a and 32b and column 6 lines 9-53.
- In regard claim 77, the limitation that the first and second combiners use weighting factors selected to produce a rotated signal constellation can further be taught by Razzell in (Fig.3 and column 4 line 1- column 6 line 54).
- In regard claim 78, the limitation that the first and second combiners use weighting factors selected to produce a rotated signal constellation rotated approximately 22.5 degrees can further be taught by Razzell in Fig.2 elements "0" –"7" and column 3 line 61 – column 4 line 41.

12. Claims 26-28, 34-36, and 44-49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dent (US5,673,291) in view of Razzell (US5,428,643) and further in view of Dent (US5,867,537).

- In regard claim 26, Dent ('291) and Razzell discloses all limitation as described in the above paragraph except specifically teaching that the filtered waveform segments are represented by a sequence of sigma-delta values.  
  
Dent ('537) teaches a balanced transversal I,Q filters for quadrature modulations that the filtered waveform segments are represented by a sequence of sigma-delta values (Fig.2 element 41 and column 2 line 52 – column 3 line 48) so

as to improve practical silicon integratable tolerances for manufacture of continuous-time filters covering radio communication range.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Dent ('291) and Razzells' modified waveform generator and balanced I/Q filter in view of Dent's ('537) teaching in order to improve practical silicon integratable tolerances for manufacture of continuous-time filters covering radio communication range.

- In regard claim 27, the limitation that the modulation waveform is generated in balanced form on two outputs for each of the real and the imaginary parts can further be taught by Dent ('537) in Fig.2 elements 43 and 44, and column 3 lines 1-48.
- In regard claim 28, the limitation that the filtered waveform segments are produced as a balanced signal represented on two outputs and are represented by a sequence of sigma-delta values and its complement can further be taught by Dent ('537) in Fig.2 elements 41, 43 and 44, and column 2 line 52 – column 3 line 48.
- In regard claim 34, the limitation that the look-up table contains over-sampled sigma-delta representations of the pre-computed filtered waveform segments can further be taught by Dent ('537) in Fig.3 and 4 and column 5 line 59 – column 6 line 34.
- In regard claim 35, the limitation that generating a plurality of filtered waveform segments includes inputting the bit sequences and their complements to a

resistive combining network can further be taught by Dent ('537) in Fig.3 elements 60, 80, and column 4 line 52 – column 6 line 53.

- In regard claim 36, the limitation that generating a plurality of filtered waveform segments comprises inputting the bit sequences and their complements to corresponding first and second complementary resistive combining networks to generate balanced filtered waveform segments on two outputs corresponding to each of the bit sequences can further be taught by Dent ('537) in Fig.3 elements 60, 80, and column 4 line 52 – column 6 line 53.
- In regard claim 44, which is a waveform generator claim related to claim 34, all limitation is contained in claim 34. The explanation of all the limitation is already addressed in the above paragraph.
- In regard claim 45, all limitation can further be taught by Dent ('537) in Fig.3 elements 60, 80, and column 4 line 52 – column 6 line 53.
- In regard claim 46, the limitation that the waveform generator includes first and second two-wire resistive combining networks for generating respectively the real and imaginary part of the modulation waveform in balanced form can further be taught by Dent ('537) in Fig.3 elements 60, 80, and column 4 line 52 – column 6 line 53.
- In regard claim 47, the limitation that the first combining network forms a weighted sum of first and second filtered waveform segments, and the second combining network forms a weighted sum of third and fourth filtered waveform

segments can further be taught by Dent ('537) in Fig.4 elements 95, 50a and 50b, 60a and 60b, 80a 80b, 90a, and 32a and 32b and column 6 lines 9-53.

- In regard claim 48, all limitation can further be taught by Dent ('537) in Fig.4 elements 50a and 50b and column 6 lines 9-53.
- In regard claim 49, all limitation can further be taught by Dent ('537) in Fig.3 element 50, 60, and 80, Fig.4 elements 50a and 50b, column 4 line 52 – column 6 line 53, and column 6 lines 9-53.

13. Claims 58-61 and 63-66 are rejected under 35 U.S.C. 103(a) as being unpatentable over Razzell (US5,428,643) in view of Dent (US5,867,537).

- In regard claim 58, Razzell discloses all limitation as described in the above paragraph except specifically teaching that the component waveforms are stored as a set of sigma-delta sample values.

Dent ('537) teaches a balanced transversal I,Q filters for quadrature modulations that the component waveforms are stored as a set of sigma-delta sample values (Fig.2 elements 41-44, Fig.4 elements 50a and 50b, column 4 line 52 – column 6 line 53, and column 6 lines 9-53) so as to eliminate the adjacent channel interference.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Razzell's transmitter to store the component waveforms as a set of sigma-delta sample values in memory in view of Dent ('537) teaching in order to eliminate the adjacent channel interference.

- In regard claim 59, the limitation of combining the sigma-delta sample values to produce the real and imaginary parts of the modulation waveform in balance form can further be taught in by Dent ('537) in Fig.2 element 44, Fig.3 elements 50, 60, 70, 80, and 90, and column 4 line 52 – column 5 line 58. All other limitation is contained in claim 54. All explanation has been described in above paragraph.
- In regard claim 60, the limitation of filtering the bit sequences in respective resistive combining networks to generate the component waveforms can further be taught by Dent ('537) in Fig.2 element 44, Fig.3 elements 50, 60, 70, 80, and 90, and column 4 line 52 – column 5 line 58. All other limitation is contained in claim 54. All explanation has been described in above paragraph.
- In regard claim 61, all limitation can further be taught by Dent ('537) in Fig.4 elements 95, 50a and 50b, 60a and 60b, 80a 80b, 90a, and 32a and 32b and column 6 lines 9-53.
- In regard claim 63, all limitation can further be taught by Dent ('537) in Fig.4 elements 95, 50a and 50b, 60a and 60b, 80a 80b, 90a, and 32a and 32b and column 6 lines 9-53.
- In regard claim 64, the limitation that the modulation waveform is generated in balanced form on two outputs for each of the real and imaginary parts can further be taught by Dent ('537) in Fig.2 elements 43 and 44, Fig.4 elements 32 a, 32b, and 43, column 2 line 52 – column 3line 48, and column 6 lines 9-53.

- In regard claim 65, the limitation that the weighting factors are selected to produce a rotated signal constellation can further be taught by Razzell in Fig.2 elements "0" – "7" and column 3 line 61 – column 4 line 41.
- In regard claim 66, the limitation that the signal constellation is rotated approximately 22.5 degree can further be taught by Razzell in Fig.2 elements "0" – "7" and column 3 line 61 – column 4 line 41.

***Allowable Subject Matter***

- 14. Claims 1-20 are allowed.
- 15. Claims 23, 24, 37-39, 50-53, and 62 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
- 16. The examiner's statement of reasons for allowance has been given on paper # 5 filed on 3/18/2004.

***Conclusion***

- 17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ted M Wang whose telephone number is (571) 272-3053. The examiner can normally be reached on 8:30 a.m. - 5:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Chin can be reached on (571) 272-3056. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.



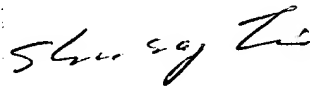
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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 306-0377.

Ted M Wang  
Examiner  
Art Unit 2634

Ted M. Wang

A handwritten signature in black ink, appearing to read "Shuwang Liu".

**SHUWANG LIU**  
**PRIMARY EXAMINER**